

## Focus on IFA's work

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# Physical stress profiles at checkout workplaces

### Problem

In Germany, some 500,000 sales points with checkouts are to be found in the retail sector. Owing to changes in shopping habits and to technical developments, work at checkouts and the design of the corresponding workplaces have changed, with a trend towards working procedures becoming more monotonous. The working task is increasingly limited to the continually repeated scanning of purchases, and acceptance of payment for them.

The ergonomic design of checkout workplaces is hampered by a dearth of comparative studies into the physical stress caused both by static, unfavourable body postures, and by repetition. To address this, the CUELA measurement system<sup>1</sup> was to be used in the present project in order to obtain the typical stress profiles. The project was launched by the German Social Accident Insurance Institution for the trade and distribution industry (BGHW).

The objective was to produce recommendations for the ergonomic design of checkout workplaces, following analysis of the physical stress profiles; to substantiate these recommendations; and if applicable, to formulate test criteria.



Checkout operator with CUELA measurement system for recording of postures and movements of the shoulders, arms and hands

### Activities

Test measurements for seated postures and for the shoulder-arm-hand system were first conducted in a pilot study on two female test subjects by means of the CUELA measurement system. Evaluation of the data showed the CUELA measurement system to be suitable for identifying foci of stress in checkout operators' work and for attributing these foci to particular design aspects of the checkout workplace. Based upon the results from the pilot measurements, the IFA conducted systematic studies on a number of test subjects at four different checkouts. The checkouts differed in the arrangement of their feed and takeaway belts and in the position of the till drawer, the scanner, the receipt printer and the keypad.

<sup>1</sup>CUELA system of computer-assisted measurement and long-term analysis of musculoskeletal workloads

The results were compared with findings from similar studies.

### Results and Application

Comparative study of the musculoskeletal workload at the different checkout workplaces enabled the ergonomics of their design to be evaluated. For example, analysis of the arm postures in terms of shoulder and elbow flexion showed an advantageous arrangement to be one with the takeaway belt at an angle of approximately 30° to the feed belt and to the scanner, and with the latter located as close as possible. The belts should also be of adequate length for feed and takeaway. A suitable position for the till drawer is between the two belts and in front of the checkout operator's body. For the keypad, display and receipt printer, an adjustable, modular arrangement appeared to be advantageous. Results of measurements of the seating posture indicated that the work surface should have a height of 860 mm. In addition, a footrest with height adjustment should be provided, in order to permit the necessary adjustments for individual checkout operators.

The results of the study also confirm that training of checkout operators should be stepped up generally, for example by means of the video produced by the BGHW on fitness at checkouts. Above all, the ergonomic design elements for situational prevention are made effective by means of instruction in their use.

### Area of Application

Prevention services of the German Social Accident Insurance Institutions; occupational disease case workers

### Additional Information

- 3<sup>rd</sup> Fachgespräch Ergonomie, summary of the papers, held at the 3<sup>rd</sup> Fachgespräch Ergonomie on 29 and 30 October 2007 in Dresden. BGAG-Report 1/2008. Published by: Deutsche Gesetzliche Unfallversicherung (DGUV), BGAG, Dresden 2008, p. 134
- 4<sup>th</sup> Fachgespräch Ergonomie, summary of the papers, held at the 4<sup>th</sup> Fachgespräch Ergonomie on 10 and 11 November 2010 in Sankt Augustin. IFA Report 6/2011. Ed.: Deutsche Gesetzliche Unfallversicherung, Berlin 2011 [www.dguv.de/ifa](http://www.dguv.de/ifa), Webcode [d120265](http://www.dguv.de/ifa)

### Expert Assistance

IFA, Division 4: Ergonomics – Physical Environmental Factors

### Literature Requests

IFA, Zentralbereich